

CLAIMS

WHAT IS CLAIMED IS:

1. A surface modified enzyme comprising an enzyme genetically engineered to include a stabilizing group at the N-terminus, which stabilizing group is used to immobilize the enzyme onto a polymerized vesicle or inorganic surface.

2. The surface modified enzyme according to claim 1 wherein the stabilizing group is selected from the group consisting of histidine and polyhistidine.

Sub a8 3. A method for stabilizing enzymes comprising:
genetically engineering an enzyme to include a stabilizing amino acid substitution;
copolymerizing an amphiphile containing a salt selected from the group consisting of metal salts of iminodiacetic acid, nitrilotriacetic acid, and mixtures thereof with other polymerizable amphiphiles to form vesicles;
binding the genetically engineered enzyme to the salts on the outer surface of the vesicles.

4. The method according to claim 3 wherein the metal salts are selected from the group consisting of copper, nickel, cobalt, and zinc salts.

Sub a9 5. The method according to claim 3 wherein the stabilizing amino acid is selected from the group consisting of histidine or polyhistidine.

6. The method according to claim 3 wherein the enzyme is thioesterase.

7. The method according to claim 3 wherein the salt is a metal salt of iminodiacetic acid.

8. The method according to claim 3 wherein the salt is a metal salt of nitrilotriacetic acid.

See 910
9. A method for stabilizing enzymes comparing:
genetically engineering an enzyme to include a stabilizing amino acid substitution;
attaching said stabilized enzyme to salt groups selected from the group consisting of
metal salts of iminodiacetic acid, metal salts of nitrilotriacetic acid, and mixtures thereof on
the surface of a particular inorganic carrier.

10. The method according to claim 9 wherein the metal salts are selected from the
group consisting of copper, nickel, cobalt, and zinc salts.

See all
11. The method according to claim 7 wherein the carrier is a metal oxide ceramic
particles that can be formed in the Stober process starting with a metal alkoxide precursor.

12. The method according to claim 9 wherein the metal oxide particles are selected

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PATENT APPLICATION

1 from the group consisting of silica, alumina, baria, titania, and gircinia.

2 13. The method according to claim 9 wherein the salt groups are metal salts of
3 iminodiacetic acid.

4
5 14. The method according to claim 9 wherein the salt groups are metal salts of
6 nitrilotriacetic acid.

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